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### REMARKS

Claims 1 and 13 have been amended. New Claims 23 and 24 are added. No new matter is added. Support for the amended Claims 1 and 13 can be found throughout the specification, specifically on page 8. Support for the new Claims 23 and 24 can be found on page 9, paragraph [0020] of the specification. Claim 18 has been amended to correct minor informalities noted upon a review thereof. Favorable reconsideration and allowance are requested in light of the foregoing amendments and the remarks which follow.

#### **1. Recapitulation of Invention**

A brief review of the invention is believed to be in order before discussing in detail the deficiencies of the prior art relied upon in the Examiner's rejection. The present invention is directed to a pulp delignification process. The pulp is treated with chlorine dioxide at medium consistency for a time period equal to or greater than 75 minutes. Surprisingly, the Applicant has discovered that delignification process of this invention results in pulp having improved brightness, lower Kappa number and/or enhanced removal of hexenuronic acid ("Hex-A"). These results are clearly demonstrated by the experimental results set forth in Table II on page 8 and Tables XVII, XVIII, and XIX on page 32 of the specification. For example, as shown in Table II, the treatment of pulp at a low consistency of 4%, a relatively short retention time of 25 minutes, and a chlorine dioxide concentration of 1% reduces Hex-A content by 20%. The treatment of pulp at medium consistency, longer retention times of 75 minutes to 130 minutes reduces "Hex-A" concentration from 33% to as much as 58% using less chlorine dioxide. The present invention and the advantages attendant thereof are not described, taught or suggested in the cited references.

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**2. Rejection of claims under 35 USC § 102 as Anticipated by USP 6,235,153**

**(UCHIDA et al.)**

The Office Action rejects claims 1-10, 13-15, 17 and 18 under 35 USC § 102(b) as being anticipated by UCHIDA et al. This rejection is respectfully traversed.

To support a rejection of claims as anticipated, The Examiner must cite a single prior art reference which identically describes, either expressly or inherently, each and every element of the claim as set forth in the claim (MPEP §2131, citing *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir.1987)). The Examiner has not met this requirement.

Claims 1-10, 13-15, 17 and 18 require that the pulp be treated with chlorine dioxide for a time of at least 75 minutes at medium consistency. There is absolutely no disclosure whatsoever of a retention time period of at least 75 minutes or treatment of pulp at medium consistency as recited in the amended claim 1 of the present invention. Thus, UCHIDA et al does not identically describe the invention of the rejected claims as is required for anticipation. Therefore is rejection is inappropriate and should be withdrawn.

**3. Rejection of claims under 35 USC § 102 as Anticipated by USP 6,235,153**

**(HENRICSON)**

Claims 21 and 22 are rejected under 35 USC § 102(b) as being anticipated by HENRICSON. This rejection is respectfully traversed.

As noted above, in evaluating an invention for anticipation the invention must be considered as whole. Each limitation of the claim is material and essential, and limitation can not be ignored in assessing patentability. See In re Stencel, 828 F. 2d 751, 4 USPQ 1071, (Fed. Cir.

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1987), and Diversitech Corp. v. Century Steps Inc., 892 F 2d 1562, 7 USPQ 2D 1315 (Fed Cir. 1988).

The independent Claim 21 and dependent Claim 22 of the present invention recite removal of Hex-A from a medium consistency pulp in a vessel with chlorine dioxide for a time not less than about 75 minutes. (emphasis added). Moreover, new Claims 23 and 24 recite removal of 70% or even 80% of hexauronic acid (Hex-A) from the digested cellulosic pulp. However, as the Examiner admits in Office Action, HENRICSON discloses removal of 50% hexauronic acid (Hex-A) from the pulp to obtain a significant savings in chlorine dioxide (page 3 of OA, paragraph 2). In addition, nowhere does HENRICSON identically describe or even mention that hexauronic acid (Hex-A) can be extracted from medium consistency pulp by treatment with chlorine dioxide for a time not less than 75 minutes. Since the independent Claim 21 is not identically described in the cited reference, therefore the independent Claim 21 and Claim 22 which is dependent therefrom can not be anticipated by the cited reference. Applicant believes that this rejection is in error and should be withdrawn.

**4. Rejection of claims under 35 USC § 103 as being obvious by USP 6,306,253  
(HENRICSON)**

Claims 21 and 22 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over HENRICSON. This rejection is respectfully traversed.

The Examiner states in the Office Action: "HENRICSON teaches treating pulp at the pH of 2 to 5 and a temperature of 75 to 130 C (167- 266 F) for a preferred time of 50 to 150 minutes (column 2, line 26) prior to chlorine dioxide bleaching to remove preferably 50% of the hexenuronic acids from the pulp". Assuming, arguendo, the Examiner is correct, still

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HENRICSON does not teach or suggest the removal of 70% or even 80% of hexauronic acid (Hex-A) from the digested cellulosic pulp as recited in Claims 23 and 24 of the present invention. As noted above, HENRICSON discloses acid pretreatment before the Do delignification stage for selective removal of Hex-A at a pH of 2-5 and temperature of 70-130 C. The present invention discloses that the pulp having a medium consistency and retention time of at least 75 minutes as the data show in the examples of Table II on page 8 and Tables XVII, XVIII, and XIX on page 32 of the specification. Thus, treatment of medium consistency pulp for longer than 75 minutes provides results which in general are better than pulp provided by treatment at low consistency. Therefore, HENRICSON provides no apparent basis for concluding that a person of ordinary skill in the art would be motivated to modify the cited reference so as to arrive at the claimed invention with a reasonable expectation of success in achieving the advantages of the claimed invention as recited in Claims 23 and 24 and fully described throughout the specification. Therefore there is no prima facie obviousness.

**5. Rejection of claims under 35 USC § 103 as being obvious by USP 6,235,153 (UCHIDA et al.) with or without the ADMITTED PRIOR ART**

Claims 1-10 and 13-20 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over UCHIDA et al with or without the ADMITTED PRIOR ART. This rejection is respectfully traversed.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally,

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the prior art reference (or references when combined) must teach or suggest all the claim limitations. Indeed, both the suggestion and the expectation of success must be found in the prior art, not in the Applicant's disclosure. In re Vaeck, 20 USPQ2d 1438 (Fed. Cir. 1988) (emphasis added). The Applicant believes that the Examiner has failed to make a *prima facie* case of obviousness.

UCHIDA et al disclose a pulp bleaching stage with chlorine dioxide under a pressure created by a compressed gas O<sub>2</sub> preferably at a pH of 2 to 5, temperature of 50 to 120 C, and consistency 5 to 40%. UCHIDA et al clearly disclose that: "*the inventors of the present invention have provided a pulp-bleaching method in which an alkali-oxygen-delignified pulp is treated with an acid in an oxygen containing gas under pressure*" (Col. 3, lines 1-4). On the contrary, the present invention is directed to a delignification process and not a bleaching process. In the present invention the medium consistency pulp is treated with chlorine dioxide for not less than 75 minutes for enhanced efficiencies of delignification and Hex-A removal. The two limitations in amended Claims 1 and 13 for the medium consistency Do delignification stage performance are retention time and consistency. UCHIDA et al is entirely silent on the medium consistency Do delignification with retention time and consistency or the advantage attended thereto described above, e.g., enhanced Hex-A removal and delignification. No where do UCHIDA et al provide an apparent basis for concluding a person of ordinary skill in the art would be motivated to modify the cited reference so as to arrive at the claimed invention with a reasonable expectation of success in achieving the advantages of the claimed invention. Therefore, this rejection is inappropriate and should be withdrawn.

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6. **Rejection of claims 11, 12, 21 and 22 under 35 USC § 103 as being obvious by USP 6,235,153 UCHIDA et al. with or without the ADMITTED PRIOR ART and further in view of HENRICSON**

In the present invention, Claim 11 depends from amended Claim 1 which recites subjecting the pulp at a medium consistency to chlorine dioxide for a time period of at least 75 minutes to delignify the pulp. Similarly, amended claim 21 recites the removal of Hex-A from the pulp in a vessel with a chlorine dioxide for a time not less than about 75 minutes. The deficiencies of UCHIDA et al and HENRICSON have been discussed above which these cited references neither individually nor in combination disclose the criticality of retention time of greater than or equal to 75 minutes at the medium consistency and the critical relationship between these parameters and the pulp having improved brightness, lower Kappa number and/or enhanced removal of hexenuronic acid ("Hex-A"). For example, in new Claims 23 and 24, the removal of Hex-A from the medium consistency pulp is 70% or 80% as opposed to 50% as disclosed by the cited references. In fact, the Examiner acknowledges that HENRICSON teaches treating the pulp prior to chlorine dioxide bleaching to remove 50% of the Hex-A from the pulp. Even the ADMITTED PRIOR ART which discloses "*in a typical multi-stage elemental chlorine free (ECF) bleach plants, the first chlorine dioxide stage (Do) is for delignification and the other following stages D<sub>1</sub> and D<sub>2</sub> for example) are for bleaching (brightness development, dirt removal for pulp cleanness)*" when combined with the cited references do not overcome the deficiencies of UCHIDA et al and HENRICSON. Therefore, the cited references neither suggest nor motivate a person of ordinary skill in the art to modify the cited reference so as to arrive at the claimed invention with a reasonable expectation of success in achieving the advantages of the claimed

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invention. It is readily apparent that the cited references are deficient and thus, the rejection is in error and should be withdrawn.

### CONCLUSION

In view of the foregoing amendments and the above remarks, the application is believed to be in condition for allowance, and such action is respectfully requested. Should the Examiner have any remaining questions and the attending to of which would expedite such action, the Examiner is invited to contact the undersigned at the telephone number listed below.

A one month extension of time is believed to be required. The Director is authorized to charge any fees associated with this or any other communication, or credit any over payment, to Deposit Account No. 09-0525.

Respectfully submitted,

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